





SOUTHGATE INTERCHANGE

Presentation to 2019 Virginia Concrete Conference

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Presentation Objectives

Project Orientation

Architectural Treatments

Precast Architectural Beam

Project; By the Numbers

Project Budget: \$46.7 million

Construction: \$38.6 million

Bridges & Underpasses – \$8.2 million

- 5 Major Structures
- ~4,660 cubic yards concrete
- ~327 tons of reinforcing steel
- Architectural treatment

Roadway, Drainage & Incidentals – \$30.4 million

- ~340,000 cubic yards of earthwork
- 14,672 linear feet of drainage pipe
- ~2.5 miles of Trail
- 19,926 individual plants
- Two MSE walls
- Hokie stone walls and signage



Procurement Quick Facts

Bid Alternates & Additives:

- Foundation Alternates – 3 Options, 1 Bid
- Additive Bid – FAA Funding

Incentive/Disincentives:

- Interim Milestone #2 – \$1,600/d up to \$200,000
- Substantial Completion – \$1,200/d up to \$198,000

Other:

- Cost loaded CPM schedule
- 1,177 plan sheets
- 179 structural plan sheets
- 665 contract line numbers





Project Overview / Goals

Safety Improvements

Improve Traffic Flow

Economic and Cultural Access

Defined Connection Points

Framework for Future

Development and Expansion

Transportation Alternatives

Roundabouts



Southgate &
Duck Pond Drive



Southgate &
Research Center
Drive



Project Delivery Team

Engineering and Design:
A. Morton Thomas & Associates

General Contractor:
Branch Civil

Architectural Treatment Supplier:
Hunt Valley Contractors

Bridge Design:
Athavale, Lystad & Associates

Bridge Subcontractor:
Wagman Heavy Civil

Architectural Precast Concrete:
Coastal Precast Systems

Construction Management & CEI:
MBP

Concrete Supply:
Chandler Concrete Company



Architectural Treatments

Cast-in-Place Elements:

- Fluted Fins
- Virginia Tech 1872 Shield Logo
- Cast in Place Hokie Stone from Form Liner & Coating
- Copings
- Parapets – Dogwood Pattern

Precast Arch Beam Elements:

- Virginia Tech Lettering
- Fluted Fins
- Reliefs and Reveals

Requirements:

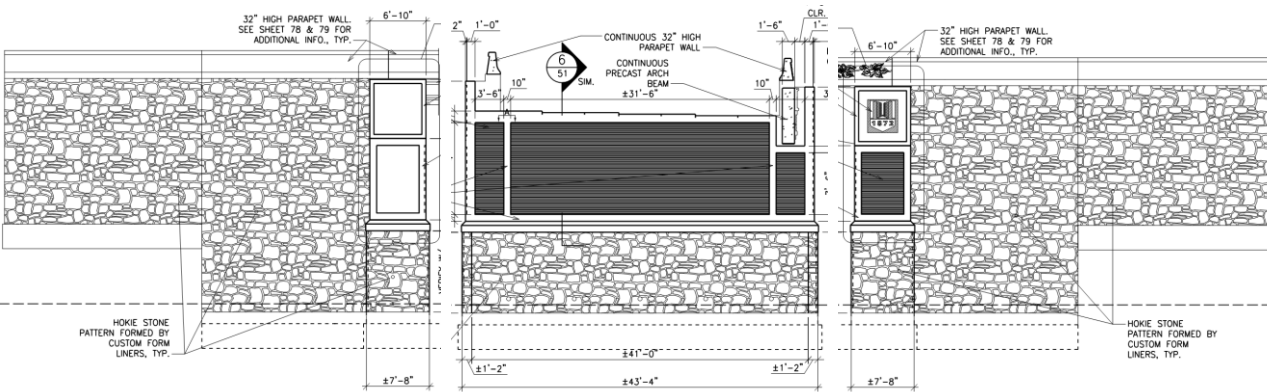
- Mock Up Panels
- Detailed Shop Drawings

Hokie Stone Form Liner

Shop Drawing Process:

- Cast Mold from Existing Facility
- Design Two 4-ft by 8-ft Panels
 - **Key Blocks**
- Build Sample Panels and Mock Up Panel for Review/Approval
- Develop Layout A, B, V, B
- Overlay Layout on Structure
 - **Avoid Stacking Effect**
 - **Avoid Repetition**
- Submit for Review/Approval





Hokie Stone Form Liner

Lessons Learned:

- Establish Mutual Understanding of Expectations
- Can Be Time Consuming
- Color Variability Obscures Liner Repetition
- Plan Corners

Recommendations/Commentary:

- Simplify Special Provisions
 - **Clear and Concise Process**
 - **Materials and Finish Expectations**
- Not All Projects Need This Level of Detail



Cast-In-Place Lessons Learned

Mock Up Panels:

- Beneficial
- Reoriented the Fluted Fins from Horizontal to Vertical Alignment
 - **Air Pockets**
 - **Alignment**
- Air Pockets at Top Horizontal Elements in the Virginia Tech 1872 Shield Logo

Atypical Sequencing:

- Casting Wings Before Abutment Breast Walls
 - **Form Removal Considerations**
 - **Fit & Finish Requirements**

Precast Arch Beam





Precast Arch Beam Challenges and Lessons Learned

Beam Serviceability & Design:

Non-Load Bearing

- No In-Service Live Loading
- Designed to Support In-Service Dead Load
- Lateral Positioning Controlled by Pins at 2-ft OC
- Pins Set in Deck by Silicone Filled Cans (Dampeners)

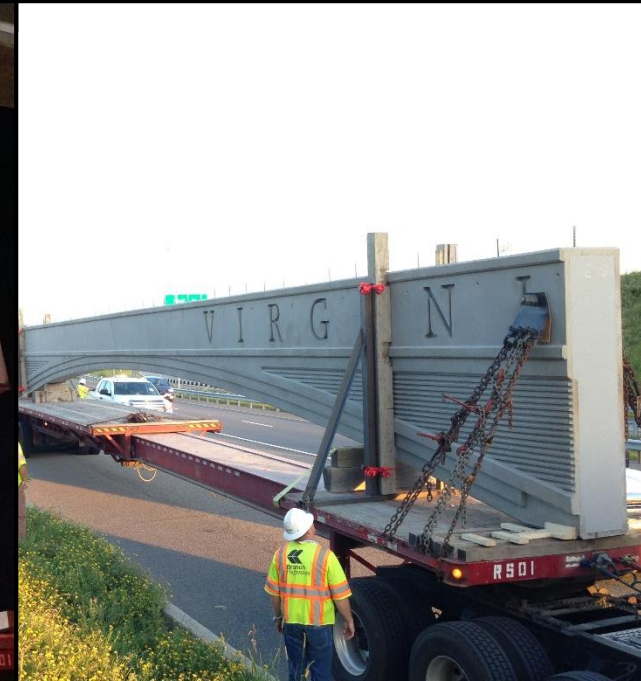
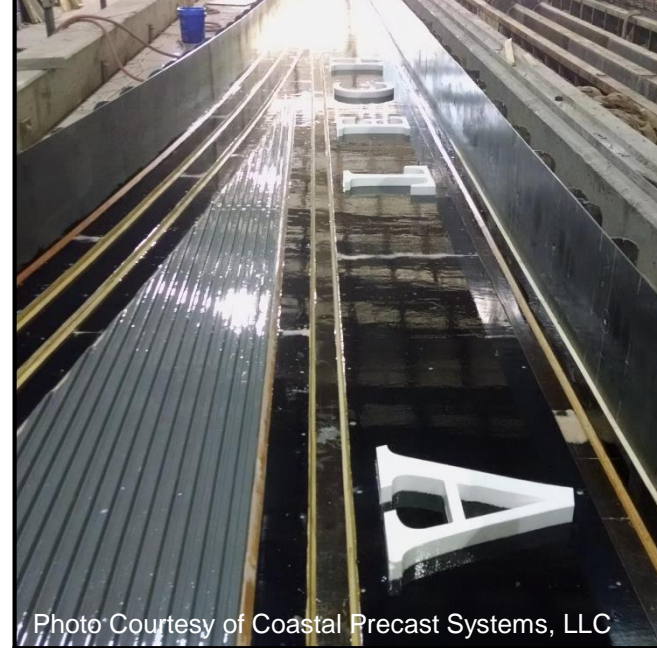
Architectural Treatment

- Face of Structural Alignment with Edge of Deck
- Architectural Treatment Projected

Precast Arch Beam Challenges and Lessons Learned

Beam Design & Fabrication:

- Design Responsibility
 - Casting Yard Handling
 - Shipping
 - Construction Loading
 - Integrated Falsework Design
- Casting Approach
 - Vertical or Face Down
 - Architectural Treatments
 - Pins





Precast Arch Beam Challenges and Lessons Learned

Deck Construction and Falsework:

- Falsework Design
 - Overhangs
 - Worker Protection
 - Work Platform
 - Support for Edge Forms
- Deck Formwork
 - 2-in Between the Bottom of Deck and Top of Precast Arch Beam
 - Pins
- Deck Concrete Finishing
 - Screed Rail on Bulb-T Girder
 - Hand Finishing

Non-Standard Design, Accelerated Schedule

Considered for Design-Build

Accelerated Design Schedule

Challenging Geometrics

Lots of Stakeholders





Questions